Marine Aviation Command and Control
ready to provide C2 at a moments notice
in any dark corner of the world …

Aviation C2 2008 Vision

APC

August 2003

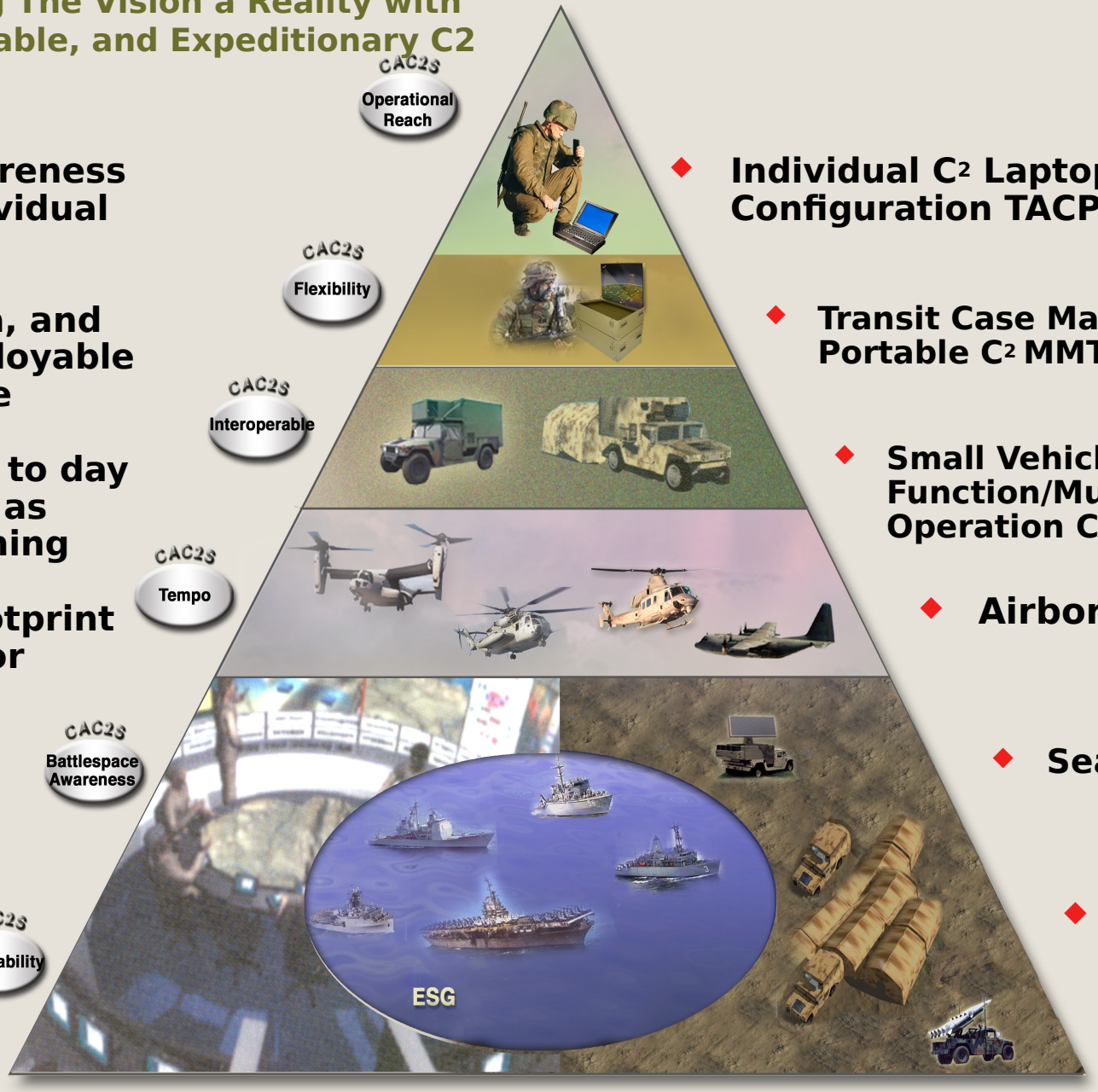
Aviation C2 Vision

- **Marine Air Command and Control Systems will provide an expeditionary C2, sensor and weapons capability that will enable timely decision making, weapons employment and C2 execution in a networked environment**
  - Modular, scalable and mobile warfighting capabilities within a family of systems
  - Flexible and sustainable to support the warfighter in a dynamic battlespace
  - Scaleable SIAP/COP (pull information required for METT-T)

Joint Battlespace awareness at all levels and from any location

CAC2S Making The Vision a Reality with Robust, Scaleable, and Expeditionary C2

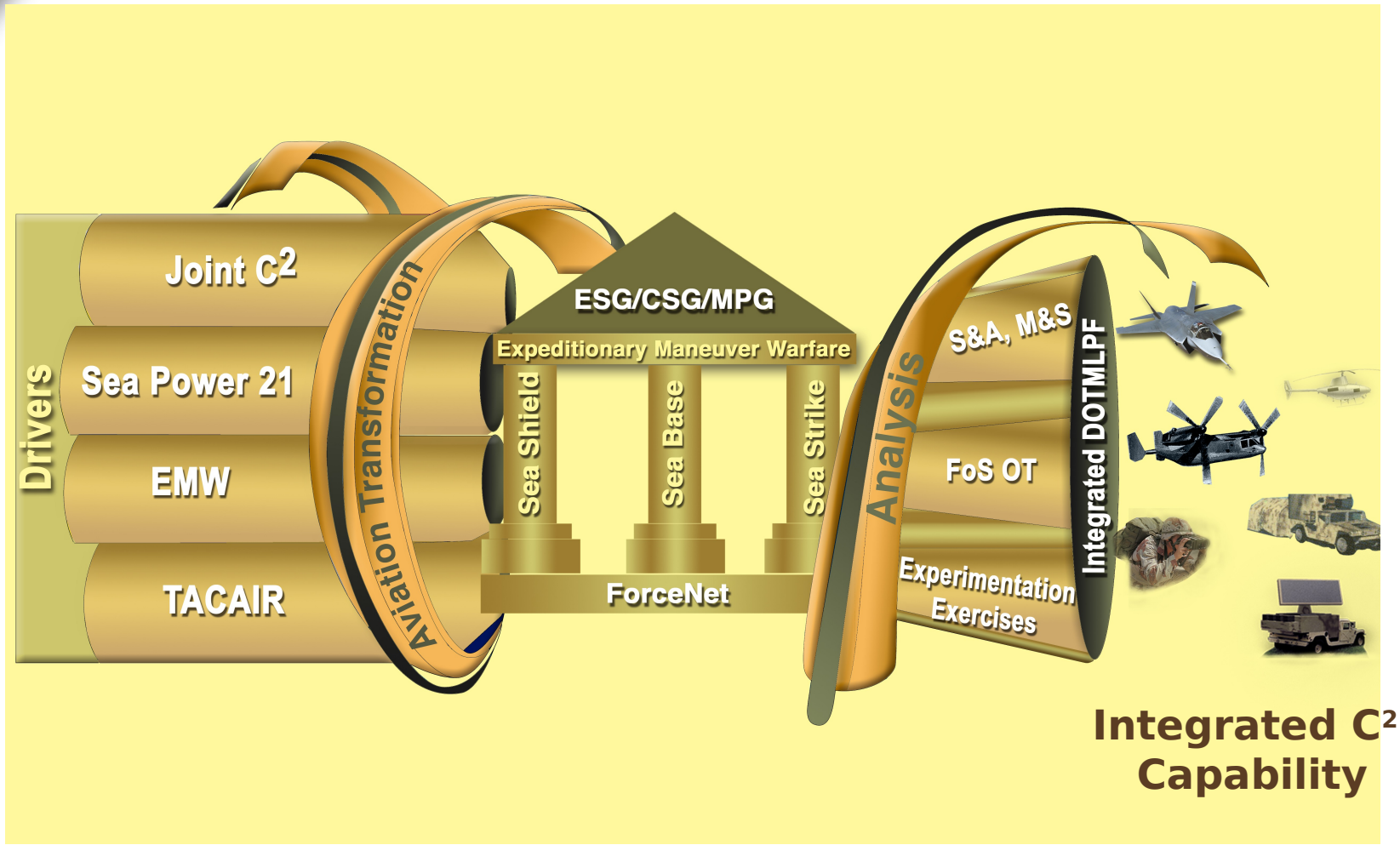
- Shared awareness to individual Marine
- Ground, sea, and air C2. Employable on the move
- Used in day to day operations, as well as training
- Physical footprint tailorable for specific OC



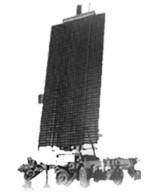
- Individual C2 Laptop Configuration TACP
- Transit Case Man Portable C2 MMT/Sensor
- Small Vehicle C2 Single-Function/Multi-Function Operation Center
- Airborne C2
- Seabased C2
- Reachback to CONUS

Command Center Seabased Extension of ESG/CSG

Drivers for Change



Joint Capability Integration



AN/TPS-59

MRRS

CLAWS

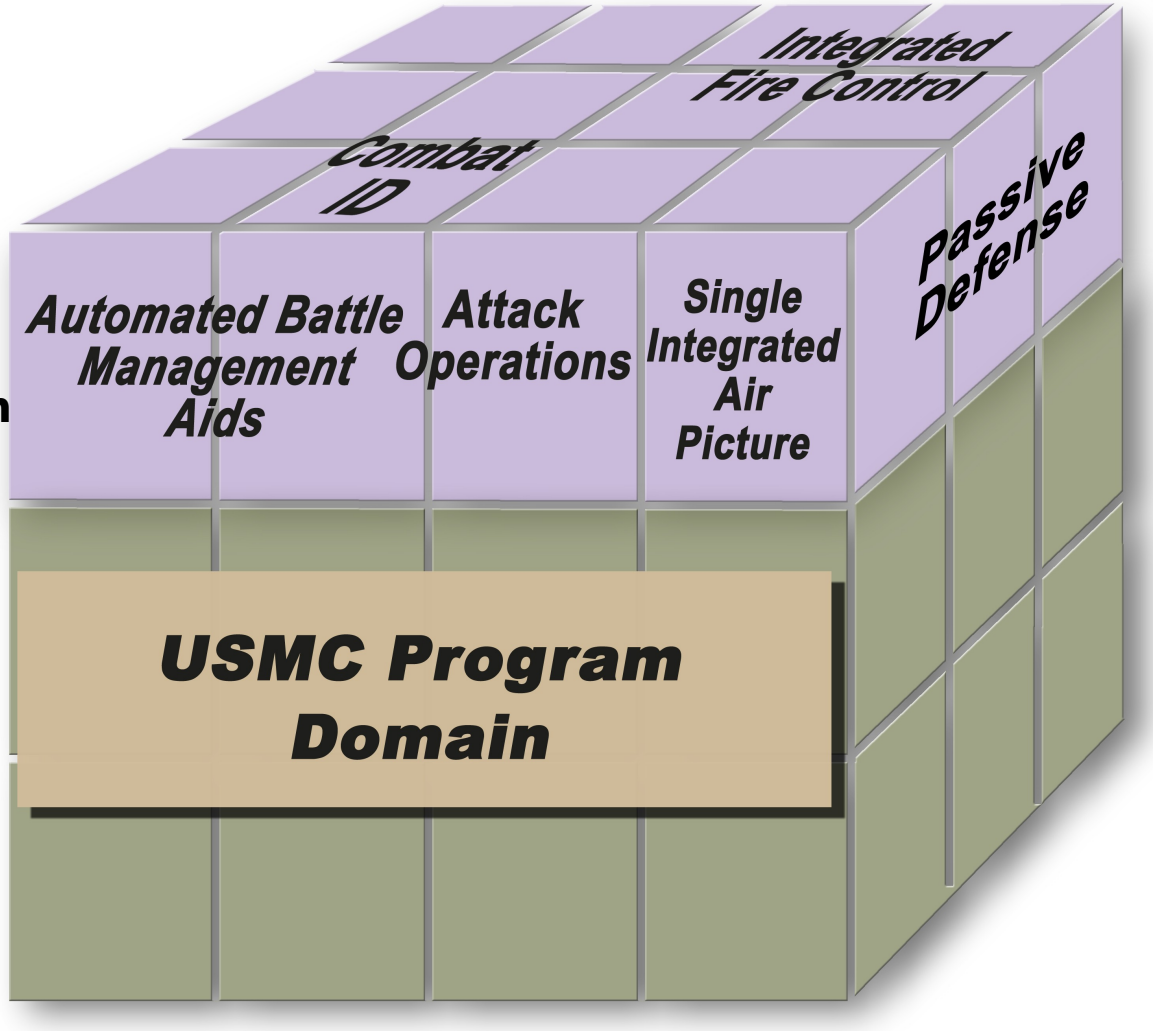
CAC2S

Joint Integration

Sensors

Weapons

Command and Control



Vision Implications : Impacts on Command & Control

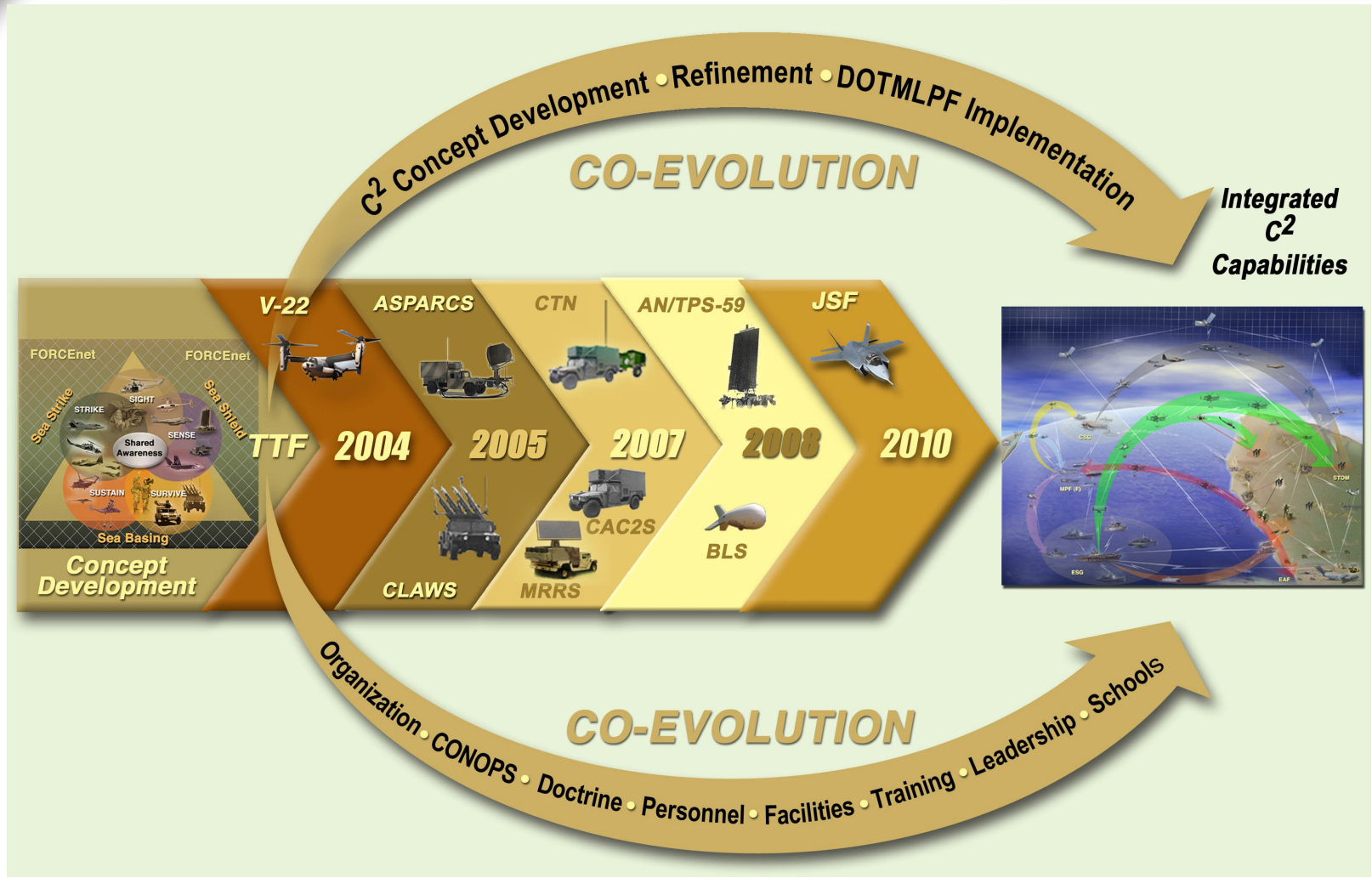
Old

- Platform Centric
- Massed Force
- Strategic Lift
- C2 Ashore
- Line of Sight
- Closed Architectures
- Service Centric
- Centralized Planning

New

- Network Centric
- Distributed Force
- Organic Lift
- Seabased C2
- Over-the-Horizon
- Open Architecture
- Joint/Multinational
- Collaborative Planning

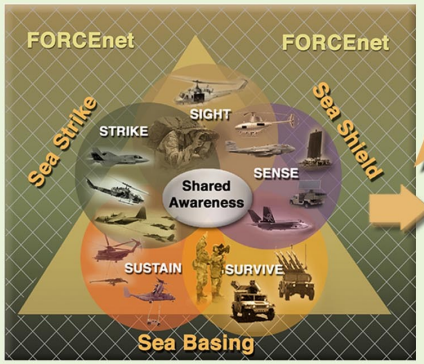
Aviation Timeline



Transformation

Co-Evolution

Aviation C² Concept For EMW



Concept Development

Studies & Analysis

Modeling & Simulation

MACCS "X"

Technology Requirements

Experiments

War gaming

ATDs

Exercises

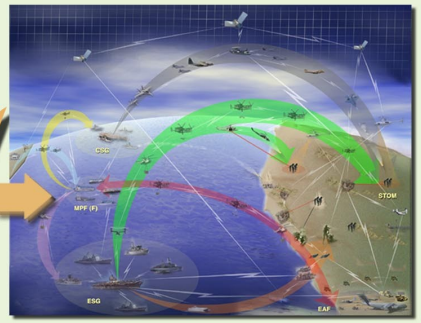
DT/OT

D O T M L P F

User feedback & Evaluation Results

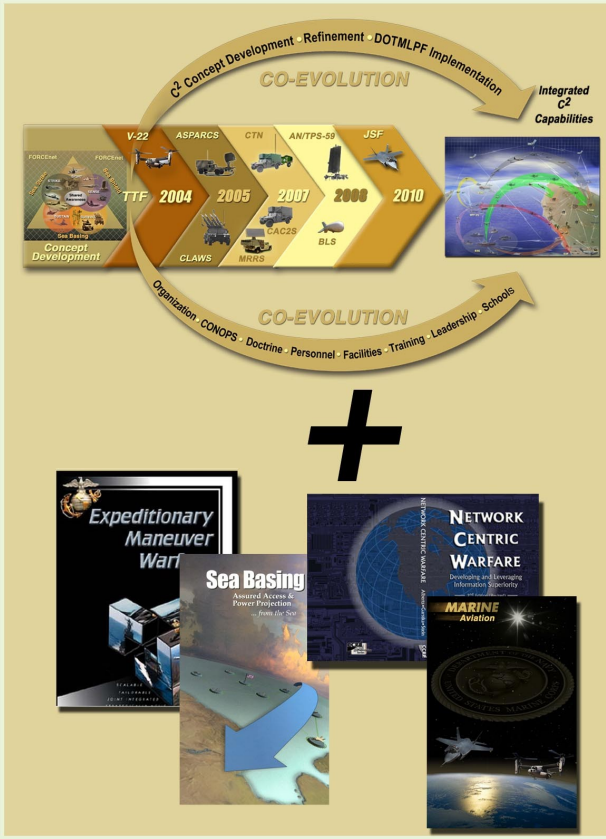
Operating Concept Refinement

Integrated C² Capability



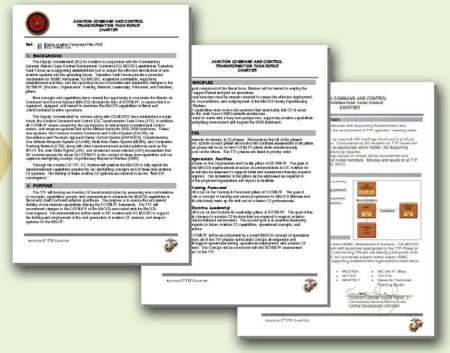
Concept of Employment METT-TSL Dependent

Response to Unprecedented Change: TTF



DC Aviation

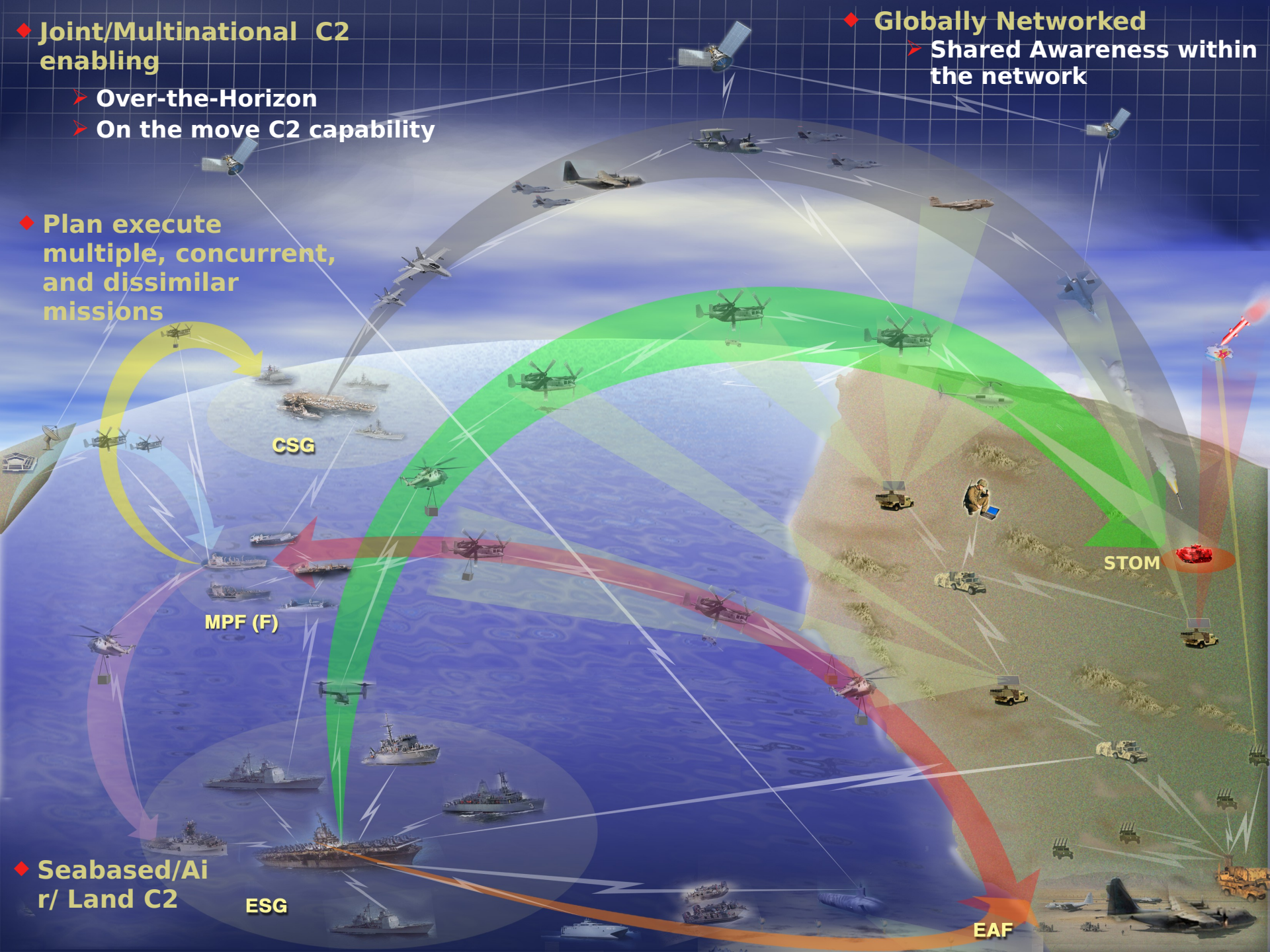
DC Combat Development



Formation of TTF

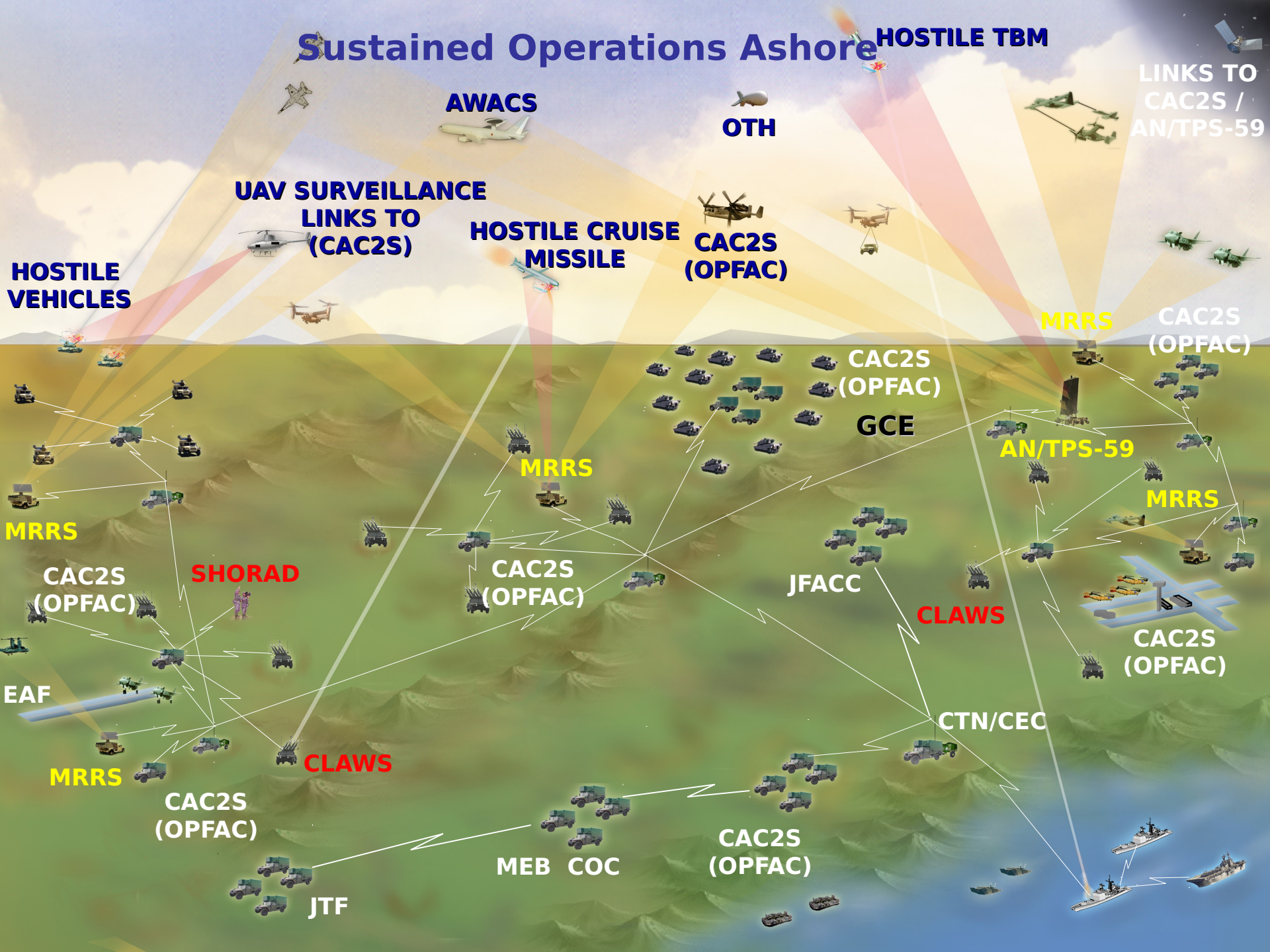
- **Purpose**
  - Proactive Optimization of DOTMLPF
- **Guiding Principles**
  - Train and Organize as you fight
  - Decisions made with a long-term perspective
- **Quarterly meetings**
  - Operating forces
  - Support establishment
  - HQMC

TTF MACG ESC/OAG #1 Priority


Joint/Multinational C2 enabling
Over-the-Horizon
On the move C2 capability
Globally Networked
Shared Awareness within the network
Plan execute multiple, concurrent, and dissimilar missions
CSG
MPF (F)
STOM
Seabased/Air/ Land C2
ESG
EAF

Expeditionary C2, Sensors, and Weapons

- Sling Loaded via V-22/CH53
- Provides over land sensor and weapons coverage


Sustained Operations Ashore
HOSTILE TBM
LINKS TO CAC2S / AN/TPS-59
AWACS
OTH
UAV SURVEILLANCE LINKS TO (CAC2S)
HOSTILE CRUISE MISSILE
CAC2S (OPFAC)
HOSTILE VEHICLES
MRRS
CAC2S (OPFAC)
GCE
AN/TPS-59
SHORAD
JFACC
CLAWS
EAF
CTN/CEC
JTF
MEB
COC

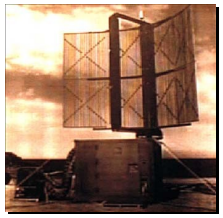
Sensor Road Ahead

- **In 2008 the MACCS will employ expeditionary networked sensors with joint/multi-national assets capable of multi-source fusion, sensor cueing, and provides fire control quality data to shooters. The MACCS as part of the joint family of systems, will be capable of tracking all airborne objects in our area of interest and supports the Aviation C2 Vision and the tenants of Network Centric Warfare**

Definitions

- **Sensor Netting**
  - The process of electronically sharing sensor data among sensors to increase capability over that provided by any single sensor
- **Sensor Fusion**
  - The process of mathematically amalgamating data derived from multiple sensors in order to create and characterize a single track. The data fused may be of several forms, including measurement reports, tracklets, tracks, features, characteristics, attributes, identification, and position reports
- **Composite Track**
  - A track generated by time data measurements from separate sensors of sufficient fire control quality to support the employment of the CLAWS weapons system

Platform vs. Network Centric

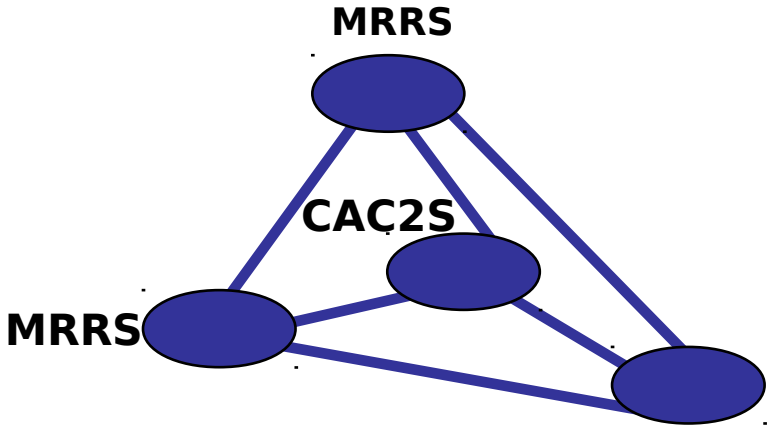


TPS 63

TPS 59

TAOM

TPS 63



Networking The Force

Sensors

Shooters

Information Timeliness

Seconds Sub-seconds

Minutes

Sensor Networks: Joint Composite Tracking

Sensor Fusion Weapons Control

Joint Data Network

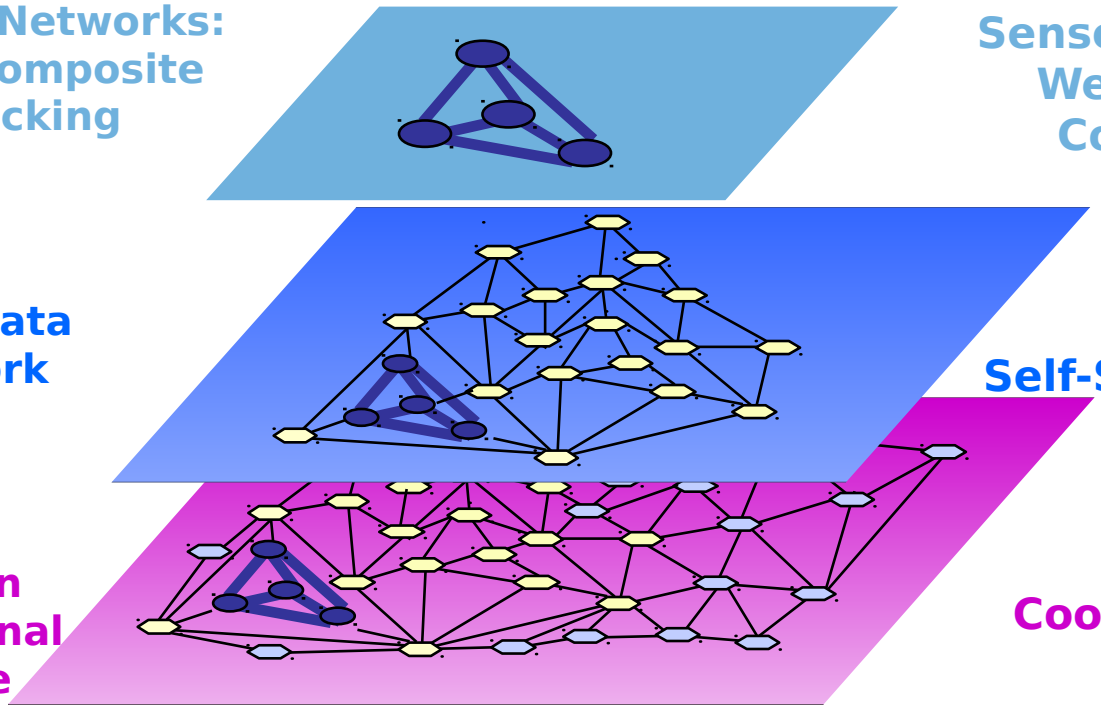
Force Control

Self-Synchronizing Forces

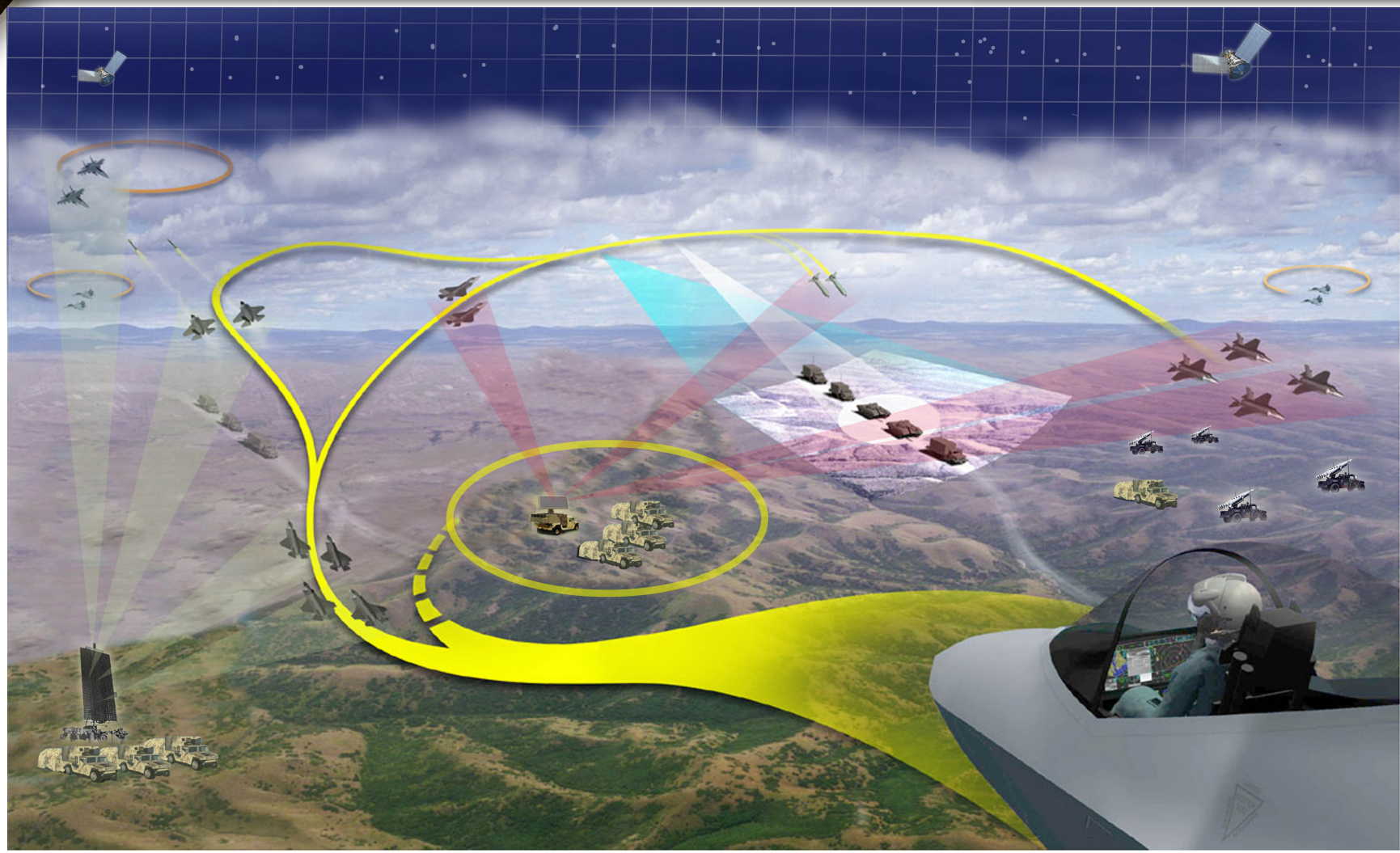
Common Operational Picture

Force Coordination

Information Accuracy

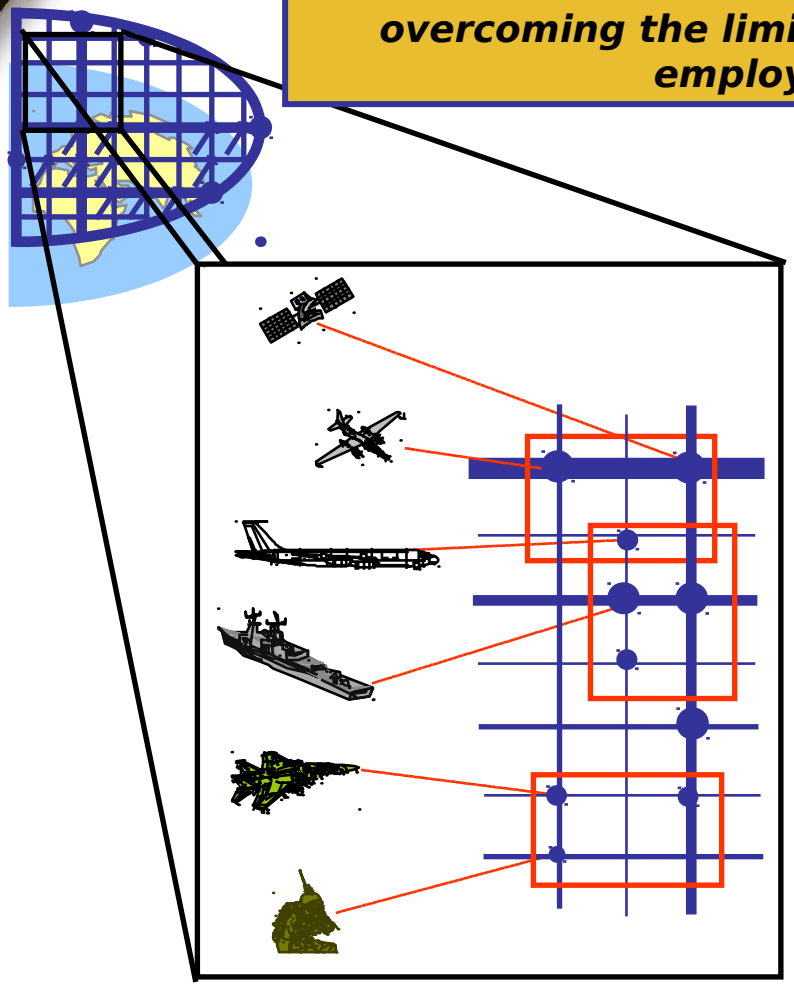


Single Integrated Air Picture for Network Centric C2 Operations



Increased Awareness

A network-centric force increases battlespace awareness by overcoming the limitations of standalone sensors through employment of sensor networks



- **Sensor Networks enable Commanders to**
  - Rapidly generate Battlespace Awareness
  - Synchronized operations
  - Maximize weapons employment
- **Dynamically network (connect, share, and collaborate)**
  - Sensors (regardless of platform)
  - Decision-makers (regardless of location)
  - Shooters (regardless of service)
- **Operational Capabilities**
  - Improved Data Fusion
  - Dynamic Sensor Tasking
  - Universal Sensor Recruitment

QUESTIONS/DISCUSSION